Abstract

Fuel Cell Having a Hydrophilic Substrate Layer

A fuel cell power plant includes a fuel cell having a membrane electrode assembly (MEA), disposed between an anode support plate and a cathode support plate, the anode and/or cathode support plates include a hydrophilic substrate layer having a predetermined pore size. The pressure of the reactant gas streams is greater than the pressure of the coolant stream, such that a greater percentage of the pores within the hydrophilic substrate layer contain reactant gas rather than water. Any water that forms on the cathode side of the MEA will migrate through the cathode support plate and away from the MEA. Controlling the pressure also ensures that the coolant water will continually migrate from the coolant stream toward the anode side of the MEA, thereby preventing the membrane from becoming dry. Proper pore size and a pressure differential between coolant and reactants improves the electrical efficiency of the fuel cell.